Priority 16: Enhance habitat for native species that have commercial, recreational, scientific, or educational uses

REV 2: Magnitude of ecosystem improvements

What is the expected magnitude of the ecosystem improvement that will address this priority? Magnitude should be expressed as: a) the change from current conditions without the project to current conditions with the project, and b) the change from 2030 conditions without the project to 2030 conditions with the project. How did you estimate this value?

The Proposed Project is anticipated to create enhanced habitat for native terrestrial and aquatic species, which would result in enhanced recreational opportunities such as fishing, camping, hiking, and birding. As illustrated in the Eligibility and General Project Information Tab, A.3 Project Description, the proposed project would create a new reservoir along the Bear River with a storage capacity of 110,000 acre-feet and a maximum inundation area of approximately 1,300 acres. The proposed Centennial Reservoir would operate as a "fill-and-spill" project, with a goal of maximizing reservoir storage during the winter and early spring runoff period. During the water delivery period (late spring through early fall), Centennial Reservoir would be used in coordination with NID's existing reservoir network to provide water to customers in NID's lower Bear River watershed service area. During the majority of years and as hydrologic conditions allow, Centennial Reservoir would be operated at or near its full gross storage (110,000 acre-feet) throughout the year, with any seasonal drawdowns due to minimum instream flow requirements and evaporative losses. In the fall and early winter, Centennial Reservoir would store any watershed runoff (in excess of minimum instream flow requirements) in order to return the reservoir to full pool.

Approximately 1,300 acres of open water habitat created by the proposed project during maximum pool conditions would replace approximately 175 acres (Bear River [169.534 ac]; Ponds [5.218 ac]) of open waters identified in the wetland delineation survey of the projected area of inundation. Although the proposed project would inundate riverine habitat, the project would create up to 1,300 acres of lacustrine habitat that would provide enhanced native fisheries habitat and would be stocked for recreational purposes.

The enhanced terrestrial and aquatic habitats for recreational opportunities would exist upon proposed project construction through the lifetime of the reservoir (i.e. beyond 2030).

Without the proposed project these habitats would remain in their current state, which is lacking in recreational value. The only recreational facility in the area is the Bear River Campground, which includes 23 family campsites and 2 group campsites. Recreational fishing along the river is limited because access to the river is only available through the Bear River Campground. The Proposed Project would substantially increase recreational opportunities in the regional area, as described in detail in Physical Public Benefits Tab, Recreation Benefits Q.1, Q.2, Q.3.

Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the magnitude of the ecosystem improvement is described and quantified.

Physical Public Benefits Tab, Recreation Benefits Q.1, Q.2, Q3.

REV 3: Spatial and temporal scale of ecosystem improvements.

What is the geographical extent (e.g. river miles, acres) of the ecosystem improvement that will address this priority?

The proposed reservoir at maximum pool would inundate approximately 1,300 acres. Therefore, the proposed project would create up to 1,300 acres of lacustrine habitat that could provide enhanced native fisheries habitat for recreational purposes.

Additional locations in the application, supporting documentation or attachments (document name, page number, figure name or number, other) where the geographical extent of the ecosystem improvement is documented or mapped.

When during the year will the project enhance habitat for native species that have commercial, recreational, scientific or educational uses? How is habitat for native species likely to vary with hydrologic conditions (i.e. among water year types) a) under current conditions with and without the project, and b) in 2030 with and without the project?

The proposed reservoir would create year-round habitat to warm and cool water fish species of recreational value, specifically trout. During the majority of years and as hydrologic conditions allow, Centennial Reservoir is anticipated to be operated at or near its full gross storage (110,000 acre-feet) throughout the year, with any seasonal drawdowns due to minimum instream flow requirements and evaporative losses. In the fall and early winter, Centennial Reservoir would store any watershed runoff (in excess of minimum instream flow requirements) in order to return the reservoir to full pool.

During a dry year, Centennial Reservoir storage would be used to augment the reliability of NID's water supply in the Bear River

watershed. Seasonal drawdown would vary based on the severity of the annual (or multi-year) drought condition.

Seasonal Releases - Releases from Centennial Reservoir would vary by season and hydrologic year type and would consist of a combination of the minimum requirement environmental flows (yet to be established), discretionary releases for water supply, and spill. Seasonally, flows in the Bear River below Centennial Reservoir are expected to peak in the late summer as water deliveries are passed through Centennial Reservoir (via Rollins Reservoir) for delivery to Lake Combie and NID's Phase I Canal. In most years, winter and spring spill can be anticipated to reach Combie Reservoir during heavy rain events in the Bear River watershed. The lowest seasonal releases from Centennial Reservoir would occur during the late fall through early winter in most years, as the reservoir refills from any mid-year drawdown and as downstream water delivery demands wane.

Although reservoir conditions may vary slightly year to year as a result of seasonal hydrological conditions, the aquatic habitat that would support native fisheries resources is expected to remain stable. Thus, with the proposed project there is the potential to create up to 1,300 acres of lacustrine habitat that would provide enhanced native fisheries habitat for recreational purposes. These enhanced native fisheries would exist through the lifetime of the project (i.e. beyond 2030). Without the project, the river channel would remain the same and there would only be 175 acres of aquatic habitat available.

Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the magnitude of the ecosystem improvement is described and quantified.

REV 4: Inclusion of an adaptive management and monitoring program that includes measurable objectives, performance measures, thresholds, and triggers to achieve ecosystem benefits.

Provide additional information on how this ecosystem improvement will be incorporated into the adaptive management and monitoring program. If available, provide examples of objectives, performance measures, thresholds, or triggers that could be used to manage benefits associated with this priority.

The Federal and State permitting processes preceding CEQA and NEPA certification and final project approval will be extensive. NID shall coordinate with USFWS and California DFW to prepare adaptive management and monitoring programs to address federally and state-listed plant and animal species potentially affected by the proposed project as well as native fisheries management. Given that the project is in the early stages of planning and environmental review, such programs have yet to be developed.

REV 5: Immediacy of ecosystem improvement actions and realization of benefits

Immediacy of ecosystem improvement: Number of months from grant encumbrance until the proposed ecosystem improvement is completed (i.e. the expected timeframe until the improvement is implemented or construction is completed).

Approximately 36 months. It is estimated that the project would take two to three years to construct the facilities. Upon completion of construction, the period of time to fill the reservoir is estimated to range up to three years. The full benefits (up to 1,300 acres) for the establishment of enhanced native fish habitat would be realized upon attaining reservoir maximum pool.

Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the immediacy timeframe is described and quantified.

Refer to Priority Form #4 for further description.

Realization of ecosystem improvement: Number of months from the time the ecosystem improvement is completed (i.e. project is implemented or construction is complete), until the benefit associated with this priority can be observed (i.e. when measurable improvements can be observed and quantified)

Approximately 0 months. The ecosystem improvement opportunity for enhanced native fisheries habitat would be established immediately in the first year in which the reservoir is filled. As stated above, it is anticipated that upon completion of construction, the period of time to fill the reservoir is estimated to range up to three years. The full benefits (up to 1,300 acres) for the establishment of enhanced native fish habitat would be realized upon attaining reservoir maximum pool.

Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the realization timeframe is described and quantified.

REV 6: Duration of ecosystem improvements

How long (number of years) after realization (as calculated under REV 5 above) is the ecosystem improvement expected to address this priority? Maximum is 100 years. Explain how this value was determined and whether the magnitude of the ecosystem improvement is anticipated to change over time.
100 years. The reservoir and related facilities are expected to be permanent and with appropriate maintenance would last for 100 years. Reservoir operations under the proposed project are envisioned to continue for the foreseeable future. With operation of the reservoir, the benefits of the proposed project for the purpose of creating habitat for native fish species would be ongoing.
Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the duration of the ecosystem improvement is described and quantified.
REV 7: Consistency with species recovery plans and strategies, initiatives, and conservation plans
Does the ecosystem improvement meet any goals or objectives established in existing species recovery plans, initiatives, or conservation plans including but not limited to the NOAA Fisheries Recovery Plan for Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead; State Wildlife Action Plan; Central Valley Joint Venture Implementation Plan, San Joaquin County Multi-Species Habitat Conservation Plan and Open Space Plan, Draft Solano Multi-Species Habitat Conservation Plan, East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan, Draft Recovery Plan for the Giant Garter Snake, and California Water Action Plan? If so which goals, objectives, or actions will be met? Why?
The 2014 California Water Action Plan was developed to meet three broad objectives: "*more reliable water supplies, the restoration of important species and habitat, and a more resilient, sustainably managed water resources system (water supply, water quality, flood protection, and environment) that can better withstand inevitable and unforeseen pressures in the coming decades.*" A critical element in achieving these objectives is the creation of additional surface storage. As stated in the plan, "*The bottom line is that we need to expand our state's storage capacity, whether surface or groundwater, whether big or small. Today, we need more storage to deal with the effects of drought and climate change on water supplies for both human and ecosystem needs.*" Opportunities for the development of a major on-stream surface storage project in California are limited as evidenced by the fact that it has been 40 years since the last such project was completed. Centennial reservoir presents an ideal opportunity for developing new significant surface storage. The project is located on a highly regulated reach of the Bear River located between two existing reservoirs (Combie and Rollins) located immediately downstream and upstream, respectively, of the Centennial site.
Additional locations in the application, supporting documentation or attachments (page number, table number, other) where the consistency with goals, objectives, or actions from recovery plans, initiative, or conservation plans are discussed.
REV 8: Location of ecosystem improvements and connectivity to areas already being protected or managed for conservation values
Provide a map that shows the extent of the ecosystem improvement that will address this priority (e.g. river miles that meet the temperature benefits). Provide additional instructions or clarification to reviewers who will be viewing this map (i.e. describe the color and/or label that identifies the spatial extent of the ecosystem improvement). If available, also submit supporting electronic files such as a .kmz file or ArcGIS layer associated with the maps provided.
Refer to the Eligibility and General Project Information Tab, A.3 Project Description Figures and Figure 1: Approximate Location of Potential Ecological Benefits included with Priority Form #14.
Explain why this location was selected. How is the location of enhanced habitat beneficial in the context of local environmental conditions?
As described above, the location being evaluated for Centennial Reservoir would effectively work in conjunction with NID's existing Rollins Reservoir to expand the total storage capability in the Bear River watershed. This use would allow additional water to be captured from natural runoff in the Bear River watershed (both the runoff in excess of what Rollins Reservoir can store on a seasonal basis as well as the runoff in the sub-basin below the Rollins Dam catchment) for the purpose of maximizing reservoir storage during the winter and early spring runoff period to provide water to customers in NID's lower Bear River watershed service area. Reservoir creation in this location would substantially alter the hydrology of upland areas that have the topography and soils conditions to support wetland habitat, but not the water source. Although enhanced native fish habitat is inherent to project implementation, it is not the primary factor in siting the proposed project.

Is the ecosystem improvement location adjacent to, or near, other areas already being protected or managed for conservation values? Explain the proximity of the ecosystem improvement to other areas already being protected or managed for conservation values and any hydrologic connectivity that may occur between these locations.
The project is not located near other areas currently being managed for conservation values related to native fisheries. However, as stated in Priority Form #15, NID in partnership with the California Division of Boating and Waterways (CDBW) and CDFW, is developing an Aquatic Invasive Species Program. The program would focus on Quagga and Zebra Mussels, which pose a serious threat to state waters and fisheries and the spread of these mussels threatens aquatic ecosystems, water delivery systems, hydroelectric facilities, agriculture, and recreation. In 2017 the program would include water chemistry monitoring, visual surveys, boat inspections, and the development of a Quagga and Zebra Mussel Prevention and Monitoring Plan. It is assumed that once the Aquatic Invasive Species Program is developed it would be implemented at the proposed project site as well as at Rollins and Combie reservoirs, which are located immediately upstream and downstream of the Centennial Reservoir site, respectively.
Additional locations in the application, supporting documentation or attachments (document name, page number, figure name or number, other) that describe and quantify the spatial extent of the ecosystem improvement, the proximity of the ecosystem improvement to other areas already being protected or managed for conservation value, and the degree to which hydrologic connections (if any) occur between the ecosystem improvement and areas already being protected or managed for conservation value.
REV 9: Efficient use of water to achieve multiple ecosystem benefits
If applicable, how will water provided to address this priority be managed? Explain design efficiencies and operational strategies intended to maximize the efficiency of water allocated to ecosystem improvements that address this priority.
Water will not be allocated specifically to maintain enhanced native fisheries for recreational purposes. However, based on the proposed operations for the Centennial Reservoir, efficiencies would be seen the majority of the year as described under REV 3 above.
Additional locations in the application, supporting documentation or attachments (document name, page number, figure name or number, other) that describe the design efficiencies and operational strategies used to maximize water efficiency under this priority.
REV 10: Resilience of ecosystem improvements to the effects of changing environmental conditions, including hydrologic variability and climate change.
Which environmental uncertainties associated with this priority were considered in the project siting, design, and operation? How were these uncertainties incorporated into project siting, design, or operation? Examples of environmental uncertainties include, but are not limited to: sea level rise, temperature changes, changes in precipitation, landslides, erosion, earthquakes, wildfires, drought events, and flooding events.
As noted under REV 7 above, the proposed project would help meet the statewide need for more surface water storage to help address the uncertainties of future drought and climate change and their effects on water supplies for both human and ecosystem needs. Centennial Reservoir presents an ideal opportunity for developing new significant surface storage. Also as stated above under REV 7 and 8, the area being evaluated for the proposed project is considered a suitable location along the Bear River since it would be located on an already regulated reach of the Bear River between two existing reservoirs. The ecosystem improvements related to enhanced native fisheries would result from coordination with California DFW to prepare adaptive management and monitoring programs to address native fisheries management for implementation after development of the Proposed Project.
Additional locations in the application, supporting documentation or attachments (document name, page number, figure name or number, other) that describe and quantify the environmental uncertainties considered in the project siting, design, and operation.